

Appln. No. 09/578,466
Amdt. dated March 23, 2004
Reply to Office Action of December 24, 2003

REMARKS/ARGUMENTS

Reconsideration of the present application, as amended, is respectfully requested.

The December 24, 2003 Office Action and the Examiner's comments have been carefully considered. In response, the specification, claims and drawings are amended, and remarks are set forth below in a sincere effort to place the present application in form for allowance. The amendments are supported by the application as originally filed. Therefore, no new matter is added.

PRIORITY DOCUMENT

It is respectfully requested that the Examiner correctly acknowledge receipt of the certified priority documents. In item 12 of the Office Action Summary (Form PTOL-326), the Examiner did not check off box 12(a)(1) which indicates that all of the priority documents have been received. Appropriate correction is requested.

DRAWINGS

In the Office Action the drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because the Examiner

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contends that the drawings do not include reference signs mentioned in the description. Specifically, the Examiner contends that the analog multiplexer (24), inverter (46), operational amplifier (47), and transistor (Q_0) are not shown in the drawings. In response, Figs. 1 and 2 of the drawings are amended to more clearly indicate the analog multiplexer, inverter, operational amplifier and transistor by appropriate reference numerals. Submitted herewith are annotated sheets showing changes to Figs. 1 and 2. New formal drawings for Figs. 1 and 2 will be submitted in due course. In view of the amendment of the drawings, reconsideration and withdrawal of the objection to the drawings are respectfully requested.

SPECIFICATION

In the Office Action the disclosure is objected to because of an informality. In response, the specification is amended to correct the informality pointed out by the Examiner. In view of the amendment of the specification, reconsideration and withdrawal of the objection thereto are respectfully requested.

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CLAIM OBJECTIONS

In the Office Action claim 12 is objected to because of an informality. Specifically, the Examiner contends that there is insufficient antecedent basis for a claim limitation set forth in claim 12. In response, claim 12 is amended to overcome the objection. In view of the amendment of claim 12, reconsideration and withdrawal of the objection to claim 12 are respectfully requested.

PRIOR ART REJECTIONS

In the Office Action claims 1, 2, 9, 33 and 34 are rejected under 35 USC 102(e) as being anticipated by USP 6,343,188 (Morofuji). Claims 3-5 are rejected under 35 USC 103 as being unpatentable over Morofuji in view of USP 6,243,132 (Lee et al.). Claims 6 and 7 are rejected under 35 USC 103 as being unpatentable over Morofuji in view of USP 5,861,915 (Sato et al.). Claim 8 is rejected under 35 USC 103 as being unpatentable over Morofuji. Claims 10-17 are rejected under 35 USC 103 as being unpatentable over Morofuji in view of Sato et al. Claims 18-20 are rejected under 35 USC 103 as being unpatentable over Morofuji in view of Sato et al., and further in view of Lee et

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al. Claims 21-23 are rejected under 35 USC 103 as being unpatentable over Morofuji in view of Sato et al., and further in view of USP 5,731,920 (Katsuragawa). Claims 24-26 are rejected under 35 USC 103 as being unpatentable over Morofuji in view of Sato et al., and further in view of Katsuragawa, and further in view of Lee. Claims 27, 31 and 32 are rejected under 35 USC 103 as being unpatentable over Morofuji and Sato et al. Claims 28-30 are rejected under 35 USC 103 as being unpatentable over Morofuji in view of Sato et al., and further in view of Lee et al.

In response, claims 1, 10, 21, 27, 33 and 34 are amended to more clearly define the present claimed invention over the cited references.

The present claimed invention as defined by claim 1 is directed to a shake correction device for inclusion in a camera which includes an image sensing device for converting a subject image to image data, a shake detecting section for detecting a shake state, a prism portion for changing an angle of a light beam passing therethrough according to a voltage applied thereto (wherein the prism portion is formed of an optical material having a refractive index which changes in accordance with the voltage applied thereto), an application voltage generating section, a storage section, a control section and a setting

section for selectively setting one of an image sensing mode for image-sensing the subject image and a test mode for measuring the relation between the voltage applied to the prism portion and the deflection angle of the light beam passing through the prism portion.

In rejecting claim 1 the Examiner relies on Morofuji.

Morofuji discloses an optical device which can correct vibrations using a variable angle prism (VAP). The VAP comprises two glass plates connected with bellows, and into which a fluid is introduced. It is possible to change the direction of the light passing through the VAP by changing the inclination of one of the glass plates. The control characteristic of the mechanism to change the inclination of the glass plates changes with time.

It is impossible to carry out correction of vibrations properly unless the amount of change in the characteristic is detected (measured) and a correction is made when the VAP is driven. Thus, the optical device of Morofuji includes a test mode for measuring the control characteristic of the VAP. In the test mode, a pseudo vibration signal (Fig. 3) is generated from a vibration correction block (Fig. 2) and the VAP is driven.

The movement of the VAP is detected by a position sensing detector (reference numerals 108, 109 of Fig. 5) using an LED and

a PSD. The characteristic of the VAP and the characteristic (response frequency, phase lag) of the control system driving the VAP can be determined by examining the behavior of the VAP in response to the predetermined vibration signal. In the test mode, correction data with the most suitable characteristic is stored, and in the actual operation mode, the operation of vibration correction is actually performed based on the correction data.

The wedge prism used in the optical device of the present invention is formed of an optical material in which a refractive index changes in accordance with a voltage applied thereto. The relation of the angle of deviation (ϕ), the arris angle (θ), and the refractive index (η) is as follows: $\phi = (\eta - 1) \theta$.

The formula is described in column 7, lines 57-67 of Morofuji.

Like Morofuji, the present invention also has a test mode to measure the characteristic data (the relation of the angle of deviation with respect to the applied voltage) of the wedge prism. In the test mode of Morofuji, the angle of deviation ϕ is controlled by changing the arris angle θ . In contrast, in the present invention, the angle of deviation ϕ is controlled by changing the refractive index η .

As mentioned above, in the present claimed invention, the angle of deviation ϕ is controlled by changing the refractive index n . That is, in the wedge prism of the present invention, the angle of deviation changes without the outer shape changing at all. Therefore, it is impossible to measure the relation between the applied voltage (pseudo vibration signal) and the angle of deviation by using a position sensor as described in Morofuji.

In the present claimed invention, a reference light beam is incident on the wedge prism from the outer part of the optical device. The position of the image of the light beam which enters the image pick-up device is measured based on image data. The relation between the voltage applied to the wedge prism and the angle of deviation of the wedge prism can be determined from the position.

The present claimed invention as defined by claim 1 is patentable over Morofuji because Morofuji does not disclose, teach or suggest a prism portion for changing an angle of a light beam passing therethrough according to a voltage applied thereto, wherein the prism portion is formed of an optical material having a refractive index which changes in accordance with the voltage applied thereto (see claim 1, lines 6-10).

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None of the other references of record close the gap between the present claimed invention as defined by amended claim 1 and Morofuji. Therefore, claim 1 is patentable over all of the cited references when taken either alone under 35 USC 102 or in combination under 35 USC 103.

In rejecting claim 10 the Examiner relies on Morofuji taken in combination with Sato et al.

Independent claim 10 is amended in a manner similar to claim 1 and is directed to an electronic still camera including an image sensing device for converting a subject image to image data, a shake detecting section including a first shake angle detecting section for detecting a shake angle in a first axial direction and a second shake angle detecting section for detecting a shake angle in a second axial direction perpendicular to the first axial direction, a prism portion for changing an angle of a light beam passing therethrough according to a voltage applied thereto, wherein the prism portion is formed of an optical material having a refractive index which changes in accordance with the voltage applied thereto, a temperature measuring circuit, an application voltage generating section, a storage section, a control section, and a setting section.

Morofuji is discussed above.

Sato et al. disclose an optical device which can correct hand deviation using a variable angle prism (VAP). According to the optical device, the operation of the hand deviation correction can be stabilized regardless of changes in the ambient temperature. More specifically, the characteristic of the compensation means compensating for the frequency characteristic of the VAP control system changes according to the temperature (reference numerals 4 and 5 of Fig. 1).

The present invention and the invention of Sato et al. are similar in changing the control method of the prism according to the temperature. However, the present invention does not include correcting the frequency in the control of the prism as described in Sato et al.

The present invention is instead directed to a method of compensating the change of the correspondence between the refractive index n and the applied voltage due to the temperature.

In view of the foregoing, claim 10 is patentable over Morofuji when taken either alone or in combination with Sato et al.

Claim 21 is rejected as being obvious over Morofuji when taken in combination with Sato et al. and Katsuragawa.

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Claim 21 is amended in a manner similar to that of claims 1 and 10.

Morofuji and Sato et al. are discussed above.

Katsuragawa discloses technology related to a converting adapter. The converting adapter can be connected to an optical device and interchangeable lens with different mount standards.

The technical field of the present invention is different, and also the idea, object and the advantages of the present invention are completely different from Katsuragawa. Katsuragawa does not close the gap between the invention defined by claim 21 and Morofuji taken either alone or in combination with Sato et al.

In view of the foregoing, claim 21 is patentable over the cited references under 35 USC 102 as well as 35 USC 103.

Claim 27 is rejected as being obvious over Morofuji when taken in combination with Sato et al. Claim 27 is patentable over the cited references for reasons, inter alia, set forth above in connection with claim 10.

Claims 33 and 34 are rejected as being unpatentable over Morofuji. Claims 33 and 34 are patentable over Morofuji for reasons, inter alia, set forth above in connection with claim 1.

Dependent claims 2-9 are either directly or indirectly dependent on claim 1 and are patentable over the cited references in view of their dependence on claim 1 and because the references do not disclose, teach or suggest each of the limitations set forth in claims 2-9.

Claims 11-20 are either directly or indirectly dependent on claim 10 and are patentable over the cited references in view of their dependence on claim 10 and because the references do not disclose, teach or suggest each of the limitations set forth in claims 11-20.

Claims 22-26 are either directly or indirectly dependent on claim 21 and are patentable over the cited references in view of their dependence on claim 21 and because the references do not disclose, teach or suggest each of the limitations set forth in claims 22-26.

Claims 28-32 are either directly or indirectly dependent on claim 27 and are patentable over the cited references in view of their dependence on claim 27 and because the references do not disclose, teach or suggest each of the limitations set forth in claims 28-32.

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If the Examiner disagrees with any of the foregoing, the Examiner is respectfully requested to point out where there is support for a contrary view.

Entry of this Amendment, allowance of the claims, and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,



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